Name_____ Date_____

AE Chemistry

Separation of a Mixture

Introduction

Mixtures are all around us from household medicines like Maalox and Cough Syrup to all of the beverages that we drink. A mixture is defined as a combination of two or more substances in which they retain their individual properties. A mixture can also be separated by physical means, meaning that no chemical reaction is need to separate the substances, just simple means like filtering and boiling can be used to isolate components of a mixture.

Separation of a mixture into its parts is one of the most important techniques in science, it is often one of the first labs you do in a high school/college chemistry lab. We have already separated one mixture this year, the dirty water in the foul water lab. In that lab you removed oil, coffee grounds, and dissolved salt from some water.

In this lab, you will be given a mixture of sand, salt, wax, and iron. As a class you will devise a method to separate all the parts of the mixture from each other. Then you will carry out your procedure over the next two days and calculate the percent of each part of the mixture.

Brainstorming

What are some properties of sand, salt, wax and iron filings? **List a property for each below.**

Looking at these properties, how could we remove each from the mixture. Describe what you will do for each step in the space below.

Now create a flow chart, ordering the procedures above into the appropriate order.

Name_____

Lab Procedures

Take the mass of the sample of the mixture your teacher gave you. _____g

Iron Filings Removal

1. Wrap a plastic baggie around a magnet and record the mass of a paper cup. _____g

2. Take your sample of mixture and stick the baggie wrapped magnet into the mixture. The iron filings will stick to the magnet.

3. Collect the iron filings in a paper cup. Place the baggie in the paper cup, and remove the magnet. The filings should fall into the paper cup.

4. Repeat this process until all of the filings are removed.

5. Now take a mass of the iron filings and the cup. _____g

6. Calculate the mass of the filings by subtracting the mass of the paper cup. _____g

Wax Removal

1. Mix your sample with 25 mL of water, and stir it **thoroughly**.

2. Collect the wax that floats to the top of the water.

3. Dry with a paper towel and record its mass. _____g

Sand Removal and Salt Recovery

1. Record the mass of a piece of filter paper _____g

2. Assemble a funnel and ring stand set up. Now add the filter paper to the funnel, making sure to fold the filter paper correctly.

3. Mass a dry evaporating dish (_____g) and place it under the funnel to collect the water after it is filtered. This is called the **filtrate**.

4. Pour the sandy-water mixture into the filter. You will need to use a rubber ended stirring rod to be sure to collect all sand.

5. Rinse the sand with 5 mL of clean water.

6. Take the filter paper with sand, and set it near the window to dry overnight.

7. Set the evaporating dish on some wire gauze supported on the ring stand. Light a Bunsen burner under the dish and evaporate the water. This part is dangerous, be certain to follow all safety precautions.

8. When the water is gone and the dish is cool, find the mass of your salt and dish. _____g
Calculate the mass of your salt by subtracting the mass of the dish from the mass you just recorded. (SHOW WORK)

_____g

9. The next day, find the mass of your sand and filter paper. _____g
Calculate the mass of your sand by subtracting the mass of the filter paper from the mass you just recorded. (SHOW WORK)

_____g

Calculations

Calculate the percent make up the mixture. Do this by using the formula below.

$$\frac{\text{Mass of } \textbf{\textit{Either}} \text{ Iron, Wax, Salt, and Sand}}{\text{Starting Mass of Mixture}} \times 100\%$$

% Iron

% Salt

% Wax

% Sand

Questions

1. Compare your percentages to those of another group. Did you get the same numbers? If the numbers are different, offer an explanation.

2. Is the mixture you separated today heterogeneous or homogeneous? Explain.

3. When you mixed the water with the sand, salt, and wax did you make a suspension, solution, colloid, or some combination of the three? Explain your answer below.

4. Suggest a way that you could make this lab more efficient or accurate.